PROPOSED PLAN FOR THE

PAGEL'S PIT SUPERFUND SITE
WINNEBAGO COUNTY, ILLINOIS

APRIL 1991

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(Winnebago Reclamation Landfill)
Winnebago County, Illinois
April 1991

U.S. EPA AND IEPA PROPOSE A CLEANUP PLAN

A number of alternatives have been proposed as remedies for the landfill and the groundwater problems at the Pagel's Pit site near Rockford in Winnebago County, Illinois. The U.S. Environmental Protection Agency (U.S. EPA) and the Illinois Environmental Protection Agency (IEPA) have analyzed the proposed remedies and have developed this Proposed Plan. The purpose of this plan is to identify the preferred alternative and compare it to the other alternatives. U.S. EPA and IEPA are issuing this Proposed Plan as part of their public participation responsibilities under section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) (hereinafter CERCLA), commonly known as Superfund.

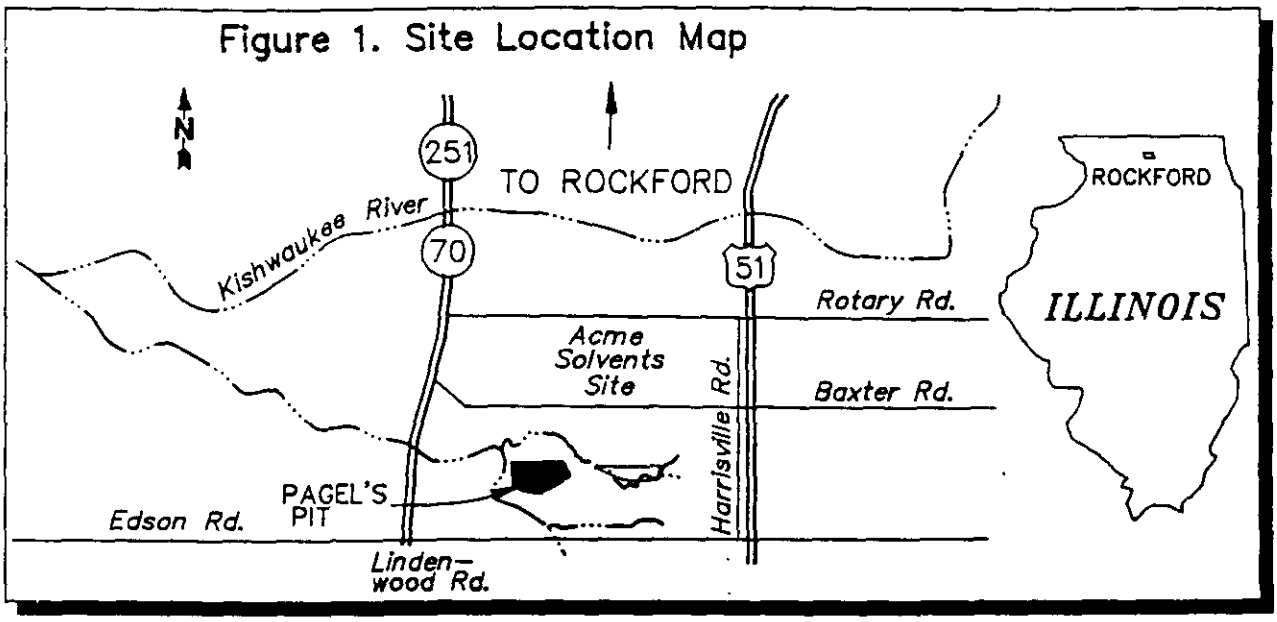
This document summarizes information from the remedial investigation (RI), the feasibility study (FS), and other documents contained in the administrative record for this site. The administrative record and other documents concerning the site are located in the local repository at the Rockford Public Library, 215 North Wyman Street, Rockford, Illinois and in the offices of U.S. EPA, Region 5, 230 South Dearborn Street, Chicago, Illinois. U.S. EPA and IEPA encourage the public to review the documents in order to gain a better understanding of the site and the Superfund activities that have been conducted there.

In consultation with IEPA, U.S. EPA, the lead agency, will select a remedy only after the public comment period has ended and the information submitted during that time has been reviewed and considered. The selected remedy will be published in a Record of Decision (ROD) issued by U.S. EPA. When this selection is made, the preferred alternative may be modified or another response action presented in this Proposed Plan and in the report for the FS may be selected, based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives outlined in the Proposed Plan. Comments received during the comment period and at the proposed plan public meeting will be addressed in a Responsiveness Summary.

SITE BACKGROUND

The Pagel's Pit site (Winnebago Reclamation Landfill) occupies about 100 acres on the west side of Lindenwood Road, south of Baxter Road and about 5 miles south of Rockford, Illinois (see Figure 1). The landfill has been in operation since about 1972 and has an estimated 5 to 7 years of capacity remaining. Municipal refuse and sewage treatment plant sludge have been the primary wastes accepted at the site. Limited amounts of Illinois special wastes have also been disposed of at the facility during its operation.

The landfill is located on a former sand and gravel quarry. It has been sequentially constructed and filled in several sections. Development has generally occurred in an east to west direction, first in the south half and then in the north half. The base of the landfill is now complete and covers



approximately 47 acres. The landfill liner was constructed by grading and compacting the base and side walls of the landfill. Then asphaltic concrete was installed over the sides and floor and compacted, resulting in a two inch thick base. The surface of the asphalt was sealed with a cationic coal tar sealer. This sealed asphalt liner was covered with eight inches of sand. A network of perforated pipe was installed in the sand on the sloping base. The pipes were connected to manholes that collected the liquid that drained from the wastes, called leachate. The leachate is pumped from the manholes to a leachate pond located on top of the landfill. The leachate is aerated in the pond and periodically trucked to the wastewater treatment plant in Rockford.

Wastes to be disposed of in the landfill enter through the gate where there is a scale. The hauler takes the wastes to the working face of the landfill where they are unloaded. Since 1985, however, sewage sludge has first been taken to the on-site sludge drying plant where it is dried before being placed in the landfill. The operator compacts the wastes into the active section of the landfill. A six-inch cover is applied over the wastes daily; this generally consists of sand and clay with some gravel. When an area has been filled to an intermediate elevation (the area will not be receiving wastes for sixty days and the final permitted elevation has not been reached), a compacted layer of additional suitable material is placed on the surface. Much of the present landfill is covered with an intermediate cover. It is planned to bring the western end of the landfill to the elevation of the eastern part of the landfill, which is about 790 feet mean sea level (MSL) Then the entire surface will be filled to bring the final top grade to 820 feet MSL. At this time the landfill will have reached capacity. The proper side slopes will be maintained with this filling.

Around 1980, landfill gas, consisting primarily of methane and carbon dioxide, was discovered to be escaping from the landfill near Lindenwood Road. Five gas extraction wells were installed in the southeast corner of the landfill. A few months later, four additional wells were installed in the

northeast corner. These wells were connected to a flare, where the gas was burned. In 1981, landfill gas was still escaping to the northeast of the landfill. Following this determination, the gas extraction system's operation and maintenance were upgraded. In 1984, these wells were replaced by a network of 70 wells located in the non-active portion of the landfill. The gas is collected from the wells and is used as a fuel source in the sludge drying operation. In November 1988, 21 additional wells were installed and connected to the system. The gas extraction wells are also used for removal of leachate from the landfill. In this use, a gas extraction well is disconnected from the system and a portable pump is placed in the well. The pump transfers the leachate to the leachate pond.

Access to part of the site is restricted by a chain link fence. Access to the rest of the site is restricted by other fencing and topography.

Because the nearby groundwater was contaminated with arsenic, cadmium, and bis(2-ethylhexyl)phthalate, the site was proposed to be included on U.S. EPA's National Priorities List (NPL) in October 1984. The NPL is the list of uncontrolled hazardous substance releases in the United States that are priorities for long-term remedial evaluation and response. Comments opposing the proposed listing were received. The site was added to the NPL in June 1986. U.S. EPA and several of the potentially responsible parties (PRPs) reached agreement on an Administrative Order by Consent, with an effective date of October 1986. This Order requires the settling PRPs to conduct a remedial investigation and feasibility study at the site.

The Acme Solvent Reclaiming, Inc. site (Acme Solvent site) is to the east of the Pagel's Pit site (see Figure 1). This site was proposed for the NPL in December 1982. From 1960 until 1972, the Acme Solvent site was used as a drum storage and disposal area for wastes, including waste paints, oils, solvents, and sludges. Disposal practices included emptying drums and tanker trucks into the Acme Solvent lagoons. A second ROD was signed for this site in December 1990. This ROD describes the approaches that are to be employed in addressing the contamination remaining at the site and the contamination in the groundwater resulting from site operations.

SUMMARY OF THE INVESTIGATION

During the remedial investigation that was carried out for the Pagel's Pit site, the area on and around both the Acme Solvent site and the Pagel's Pit site was studied. Additional monitoring wells were installed; groundwater from the shallow aquifer was sampled and analyzed at these wells and many of the other wells in the area of the two sites; water levels in many of the groundwater wells were measured; samples of leachate were analyzed; samples of water and sediments in Killbuck Creek, which flows past the western side of the Pagel's Pit site, were analyzed; and the air at the Pagel's Pit site was monitored.

The water table occurs in the fractured dolomite bedrock east and below the eastern quarter of the Pagel's Pit site. Under the remaining three quarters of the site and west of the site, the water table occurs in the unconsolidated materials, which consist predominantly of sand and gravel deposits with a thin silt or clay layer near the ground surface. Groundwater flow in the area of the two sites is generally from east to west, but in the southern part of the area, the flow is slightly south of west. Some of the groundwater may discharge into Killbuck Creek, but at least some of the groundwater flows under the creek.

Volatile organic compounds (VOCs) were found in the shallow aquifer on and in the vicinity of both sites. This aquifer serves several nearby residences as a source of water. Five residences with contaminated groundwater have been supplied with home carbon treatment units under a Consent Order with some of the Acme Solvent PRPs. The investigation of the Pagel's Pit site and the recent investigation of the Acme Solvent site reveal that the highest concentrations of VOCs have been found in several wells on and close to the Acme Solvent site. The next highest concentrations were found in several wells in the southeast corner of the Pagel's Pit site. A connection has not been established between the contamination on and near the Acme Solvent site and the contamination in the southeast corner of the Pagel's Pit site, since wells between these two areas either contained no VOCs or contained VOCs at concentrations much lower than those in these two areas. The groundwater in the southeast corner is not included in this proposal for remedial action. A future study will be carried out to determine and to establish the nature and extent of the nature and extent of the contamination there. A future study will be carried out to develop this information.

Leachate samples from the Pagel's Pit site contained relatively high levels of chloride ion. This substance was selected by the contractor doing the study as an indicator of areas of groundwater that might have been affected by leachate leaving the landfill. Based on the presence of elevated chloride ion concentrations, leachate from the landfill has been shown to be affecting the groundwater. The affected area extended from about midway along the north border of the landfill, around the western end of the landfill, and along the south border of the landfill back to at least the southwest area, but probably back to some of the southeast area of the site as well. Generally, the affected area was relatively close to the waste boundary, but a well on the other side of Killbuck Creek that contained some VOCs also exhibited elevated chloride concentrations.

Other inorganic substances were found in the groundwater at concentrations above the naturally occurring levels in the area. These included arsenic and barium, both of which are also present in the leachate.

Generally, elevated levels of conductivity and alkalinity were found in the groundwater in the wells around the landfill, indicating that some substances were being added to this groundwater. These wells included some wells that are nominally upgradient and sidegradient from the landfill.

No upstream-downstream trends were noted in the results of the sampling of water and sediment from Killbuck Creek. This indicated that the Pagel's Pit site was not impacting the water quality there.

During air monitoring, fifteen VOCs were found to be present. However, the data was of limited value because sample holding times were exceeded. The total of the highest concentrations of each of these VOCs found at any location was below the National Ambient Air Quality Standards for hydrocarbons, the only apparently applicable standard.

SUMMARY OF RISKS

A baseline risk assessment was prepared for the Pagel's Pit site to characterize the nature and estimate the magnitude of potential risks to public health and the environment. The potential risks are caused by the chemicals of concern and are based on current and possible future land use. Under a current use scenario, surface water and sediment in Killbuck Creek appeared to pose the most likely point of

chemical exposure to individuals (children) living in the area. In this scenario, it was determined that noncarcinogenic health effects would not be expected and cancer risks would be low.

The scenario pertaining to potential future groundwater use as a water supply was found to represent the greatest risk to humans at the Pagel's Pit site. Under this scenario, exposure occurs through groundwater ingestion and from dermal contact and inhalation while bathing. The calculated cumulative hazard index of 5, not including cobalt exposure, compared to the Superfund goal of 1, indicates that exposure to the noncarcinogens in the groundwater may cause adverse health effects. The majority of this is due to exposure to the 1,2-dichloroethenes, thallium, and zinc. If cobalt exposure is included, the hazard index is 100; however, cobalt was found in only one well, and the hazard due to cobalt was based on an interim reference dose. The calculated cumulative cancer risk of $1x10^{-3}$ exceeds the U.S. EPA target risk range of 10^{-4} to 10^{-6}. The majority of this is due to exposure to vinyl chloride and arsenic.

SCOPE AND ROLE OF THE REMEDIAL ACTION

The remedial action presented in this Proposed Plan addresses the wastes that have been disposed of at the site and the contaminated groundwater on and downgradient from the site. This remedial action does not address the groundwater contamination in the southeast corner of the site. The contamination there will be addressed in a separate Proposed Plan after additional studies have been performed.

The purposes of the remedial action presented in this Proposed Plan are: 1) to minimize further contamination of the groundwater at the site; 2) to prevent contact with the wastes; 3) to minimize spreading of contaminants from the site through landfill gas emissions; and 4) to prevent spreading of contaminated groundwater downgradient of the site.

Several alternatives were analyzed in a feasibility study and are briefly summarized below. Following these summaries, the preferred alternative is described. A brief evaluation of all alternatives according to the nine criteria that U.S. EPA uses to evaluate alternatives is also presented. These evaluation criteria are presented in Table 1.

SUMMARY OF ALTERNATIVES

Common Elements

The alternatives that have been evaluated are as follows:

ALTERNATIVE 1:	No Action
ALTERNATIVE 2:	Planned Closure
ALTERNATIVE 3:	Clay-Synthetic Membrane Cap
ALTERNATIVE 4:	Off-Site Treatment of Groundwater and Leachate
ALTERNATIVES 5 AND 5A:	On-Site Carbon Adsorption Treatment of Water
ALTERNATIVES 6 AND 6A:	On-Site Air Stripping of Water
ALTERNATIVES 7 AND 7A:	On-Site Photolysis/Oxidation Treatment of Water
ALTERNATIVE 8:	In-Situ Landfill Waste Fixation

Table 1. Nine Criteria for Detailed Analysis of Alternatives	
1	Overall protection of human health and the environment. The assessment against this criterion describes how the alternative, as a whole, achieves and maintains protection of human health and the environment. This assessment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.
2	Compliance with applicable or relevant and appropriate requirements (ARARs). The assessment against this criterion describes how the alternative complies with ARARs, or if a waiver is required and how it is justified. The assessment also addresses other information from advisories, criteria, and guidance that the lead and support agencies have agreed is "to be considered."
3	Long-term effectiveness and permanence. The assessment against this criterion evaluates the long-term effectiveness of alternatives in maintaining protection of human health and the environment after response objectives have been met, along with the degree of certainty that the alternative will prove successful.
4	Reduction of toxicity, mobility, or volume through treatment. The assessment against this criterion evaluates the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.
5	Short-term effectiveness. The assessment against this criterion examines the effectiveness of alternatives in protecting human health and the environment during the construction and implementation of a remedy until response objectives have been met.
6	Implementability. This assessment evaluates the technical and administrative feasibility of alternatives and the availability of required goods and services.
7	Cost. This assessment evaluates the capital and operation and maintenance (O&M) costs of each alternative.
8	State acceptance. This assessment evaluates the issues and concerns the state may have regarding each of the alternatives. This criterion is primarily addressed in the Record of Decision (ROD), after comments have been received on the Proposed Plan and the reports for the remedial investigation and the feasibility study.
9	Community acceptance. This assessment evaluates the issues and concerns that the public may have regarding each of the alternatives. This assessment is primarily addressed in the ROD, after comments that have been received have been evaluated.

There are some common components in several of the alternatives. Alternatives 2, 4, 5, 5a, 6, 6a, 7, and 7a include an Illinois sanitary landfill final cover system for the wastes that have been deposited at the site. This cover system would meet the recent regulations adopted by the State of Illinois. The cover would be constructed of a low permeability layer followed by a final protective layer. The low permeability layer would consist of a compacted earth layer at least 3 feet thick and would have a permeability that would be no greater than 10^{-7} cm/s (0.1 ft/year). Any alternative to this cover would have at least the performance of this system. The protective layer would consist of soil capable of supporting vegetation, would be at least 3 feet thick, and would protect the low permeability layer from freezing. The final slopes of the cover system would be at a grade that would be capable of supporting vegetation limit erosion and would prevent accumulation of water on the cover. The cover would be maintained after installation.

In all of the alternatives except Alternatives 1 and 8, the current landfill gas extraction system would be upgraded. The newest 21 wells would probably be retained, but would be extended upward to accommodate the increased height of the landfill. The other extraction wells would be replaced with new wells, and additional new wells would be placed in the newer portions of the landfill. The need for gas extraction wells at the perimeter of the landfill would be evaluated, and wells would be installed if necessary. Landfill gas would continue to be used as a fuel or would be flared.

Alternatives 4, 5, 5a, 6, 6a, 7, 7a, and 8 include a groundwater extraction system. The purpose of the system is to prevent the migration of contaminated groundwater to the west from the waste disposal area. Groundwater would be extracted in a series of wells installed near the western boundary of the site. These wells would be sized and spaced to capture the contaminated groundwater flowing from the vicinity of the waste disposal area. The line of extraction wells would stop the advance of the contaminated groundwater. It is expected that the groundwater extraction system would have to operate many years before the contamination in the groundwater at the site boundary would decrease to acceptable levels. At the present time it is not possible to satisfactorily estimate this time period. The water taken from these wells would be disposed of in different ways in the various alternatives. The descriptions of the alternatives provide further details.

In Alternatives 3, 4, 5, 5a, 6, 6a, 7, and 7a, deed restrictions for property development and new well development on and adjacent to the landfill would be implemented. Monitoring of groundwater, surface water, landfill gas, and the cover system would be carried out and all systems would be properly maintained.

The estimated capital costs, costs for annual operation and maintenance (O&M), and total present net worth costs for the alternatives are given in Table 2.

ALTERNATIVE 1: No Action

The Superfund program requires that the "no action" alternative be evaluated at every site to establish a baseline for comparison. Under this alternative, no further action would be taken at the site to address the problems that have been identified.

At this site, this no action alternative could occur if the landfill suddenly shut down operations and failed to close as required by its permit. The leachate collection and gas management systems would

Table 2.

Estimated Costs, Remedial Action, Pagel's Pit Site

Alternative	Capital Costs ($)	Annual O&M Costs ($)	Present Worth ($)
1	0	0	0
2	5,170,000	149,000	7,500,000
3	10,850,000	147,000	13,100,000
4	5,850,000	293,000	10,400,000
5	6,240,000	310,000	11,000,000
5a	6,620,000	439,000	13,400,000
6	5,960,000	248,000	9,800,000
6a	6,400,000	296,000	11,000,000
7	6,360,000	327,000	11,400,000
7a	6,940,000	463,000	14,100,000
8	985,000,000	204,000	989,000,000

Note: Alternative 1 (No Action) has no specific capital costs. It has been assumed that there will be no periodic sampling and analysis.

no longer be operated. The contamination of the groundwater would continue, and there would be no provisions for preventing future development on or very near the site.

ALTERNATIVE 2: Planned Closure

Under this alternative, the site would be properly closed when it reached capacity, or a decision was made by the operator to close it early. The Illinois sanitary landfill final cover system and the upgraded landfill gas extraction system described previously would be constructed at the site. The leachate collection system would be operated, and the leachate would be sent to the local publicly owned treatment works (POTW) for treatment before being discharged, as is done now. The groundwater would be monitored. The site would be properly cared for according to the terms of its operating permit.

ALTERNATIVE 3: Clay-Synthetic Membrane Cap

The wastes would be covered by a Resource Conservation and Recovery Act (RCRA) Subtitle C compliant hazardous waste cap that would reduce the infiltration of water into the wastes to very low levels and, therefore, reduce the amount of leachate. This cap might consist of two feet of compacted clay on top of the wastes, covered by a synthetic membrane, a sand drainage layer, a geotextile fabric, a soil layer (root zone), top soil, and grass.

The upgraded landfill gas extraction system described previously would be installed. The current leachate extraction system would be upgraded by installing permanent pumps in the manholes and selected gas extraction wells. The leachate would be sent to the local POTW by means of a force main connected to an existing sanitary sewer line after undergoing any pretreatment required by the POTW. The POTW would treat the leachate before final discharge.

Deed restrictions and monitoring and maintenance, as described in the common elements section, would apply.

ALTERNATIVE 4: Off-Site Treatment of Groundwater and Leachate

In this alternative, contaminated groundwater and landfill leachate would be extracted and sent to the local POTW for treatment. The combined stream would be sent to the POTW by means of a force main connected to the sanitary sewer. The groundwater extraction system described previously would be used to extract the groundwater. The leachate would be extracted using the system described in Alternative 3.

The Illinois sanitary landfill final cover system and the upgraded landfill gas extraction system described previously would be constructed at the site. Deed restrictions and monitoring and maintenance, as described in the common elements section, would apply.

ALTERNATIVES 5 AND 5A: On-Site Carbon Adsorption Treatment of Water

In Alternative 5, extracted groundwater would be treated on site to remove VOCs and semivolatile organic compounds (SVOCs) by carbon adsorption. The contaminated water would be pumped through two vessels containing the activated carbon, operated in series. Spent carbon would be

shipped off site for regeneration or disposal. A sand filter would be used to pretreat the water going to the carbon adsorption vessels to remove suspended solids. Ion exchange or coagulation/flocculation would be added for inorganics removal if required to meet discharge requirements or to prevent interference with the organic treatment process. The treated water would be discharged to Killbuck Creek. This water would be sampled periodically to ensure that discharge requirements were being met. The leachate would be transferred to the local POTW as in Alternative 3.

In Alternative 5a, both the groundwater and the leachate would be treated on-site by carbon adsorption preceded by sand filtration. The leachate would be pretreated for removal of turbidity, solids, and inorganics by pH adjustment, precipitation, flocculation, and sedimentation.

Except for the treatment that replaces transfer to the local POTW, these two alternatives are the same as Alternative 4.

ALTERNATIVES 6 AND 6A: On-Site Air Stripping of Water

Alternatives 6 and 6a are identical to Alternatives 5 and 5a, respectively, except that air-stripping would be used in place of carbon adsorption. In addition to the air-stripping, carbon polishing of the water leaving the air-stripper might be required to meet discharge limits. The air stripping system would remove volatile contaminants from the groundwater by passing the water through a packed column through which air flows countercurrently to the water. The volatile contaminants in the water would be transferred to the air. It is expected that the air emissions from the column would be low enough that treatment of the vapors would not be required. However, the air emissions would be examined further in the design, and if that study determined that controls would be necessary, they would be added. The discharges from the air-stripper will be subject to the approval of IEPA.

ALTERNATIVE 7 AND 7A: On-site Photolysis/Oxidation of Groundwater

Alternatives 7 and 7a are identical to Alternatives 5 and 5a, respectively, except that photolysis and oxidation would be used in place of carbon adsorption. An ultraviolet photolysis process enhanced by the introduction of ozone or hydrogen peroxide would be used to oxidize the organic contaminants in the water. The treatment unit would consist of a tank with ultraviolet fixtures installed inside.

ALTERNATIVE 8: In-Situ Landfill Waste Fixation

In this alternative, the landfill wastes would be solidified in place (in-situ) by injection of a reagent slurry into the closed landfill. In this fixation process, the wastes are treated by boring into the landfill and adding the reagents. Each boring creates a column of treated material circular in cross section. The wastes are transformed into a stable, solidified mass by the process.

Groundwater would be extracted and treated on site by air stripping as in Alternative 6. There would be no cap with this alternative or gas or leachate extractions systems. Deed restrictions, as described in the common elements section, would be implemented and groundwater monitoring and care of the site would be performed.

Time Required for Implementation

The periods of time required to implement the various remedial actions are comparable. The cover system would be constructed after waste capacity had been reached or a decision to close early had been made. If, however, the rate of waste disposal fell significantly so that the time for closure would extend more than a few years beyond the presently estimated years of remaining capacity, closure would be implemented before capacity was reached. The cover system would be installed as the wastes reach final elevations so that the beginning of the construction of the cover system would be well before final closure of the entire landfill would have to be accomplished. The cover system would be maintained as long as necessary. The fixation process would be implemented on much the same schedule as the final cover system.

The groundwater extraction system would be installed within an estimated two to three years after the system had been selected. As stated before, the length of time this system would have to operate cannot be estimated at this time. The landfill gas extraction system would be operated until only a negligible amount of gas was being produced. The leachate extraction system would be operated until rainwater no longer leached contaminants out of the wastes.

As required by CERCLA, a review of the remedial action selected would be conducted at least every five years after the beginning of the remedial action since wastes are being left at the site. With the no action alternative, this review would probably require some minimal amount of sampling and analysis of the groundwater, but the costs for this sampling have not been included for this alternative.

THE PREFERRED ALTERNATIVE

The alternative presently preferred by U.S. EPA and IEPA is either Alternative 5 or 6. Alternative 5 includes: a sanitary landfill cover for the waste disposal area; groundwater extraction along the west side of the site with on-site treatment using carbon adsorption to remove VOCs and SVOCs following pretreatment using a sand filter and, as necessary, treatment for removal of inorganics, and discharge of the treated water to Killbuck Creek; leachate extraction and transfer to the local POTW for treatment; gas extraction and using the gas for fuel or flaring it; and deed restrictions. Alternative 6 is the same except that air stripping is used in place of carbon adsorption.

Which of these alternative will be used (5 or 6) will be determined during the design phase when additional information will be available concerning the level of contamination in the groundwater feed stream to the treatment process. If studies show that these groundwater treatment methods would not provide sufficient removal of the contaminants, then one of the other methods discussed in this Proposed Plan would be studied and, if it appeared to be satisfactory, employed. If the leachate were not accepted by the local POTW, then one of the on-site treatment systems discussed here would be studied and used if it was determined to be satisfactory.

Following the selection of the remedy, the groundwater extraction system and groundwater treatment system would be installed as soon as possible. The sanitary landfill cover, however, would not be installed until the landfill reached capacity, a decision was made for early closure, or the filling of the landfill fell below a preset rate. A leachate extraction system is in place, and leachate is being

removed from the landfill and is being sent to the POTW. The system would not be upgraded until the filling of the landfill allowed it. A gas extraction system is in place, and it also would not be upgraded until the filling of the landfill allowed.

EVALUATION OF ALTERNATIVES

This section compares the preferred alternative to the other alternatives with regard to the nine evaluation criteria (see Table 1 for definition).

1. Overall Protection of Human Health and the Environment

All of the alternatives except Alternative 1 (No Action) and Alternative 2 (Planned Closure) and Alternative 3 (Clay-Synthetic Membrane Cap) provide adequate protection of human health and the environment. Alternatives 1, 2, and 3 do not include groundwater extraction and treatment. The groundwater would be remediated generally until maximum contaminant levels (MCLs), proposed MCLs, and non-zero maximum contaminant level goals (MCLGs) are reached, as appropriate. When necessary, a carcinogenic risk of 10^{-5} and a cumulative hazard index of one would be used. All of the alternatives except Alternative 1 provide adequate protection from contact with the wastes. Likewise, all of the alternatives except Alternative 1 provide protection from the release of contaminants from the landfill through gas and leachate extraction; however, Alternative 2 might not provide this protection for as long a period.

2. Compliance with Applicable or Relevant and Appropriate Requirements

All alternatives except Alternatives 1, 2 and 3, and possibly Alternative 4, should be able to meet the identified applicable or relevant and appropriate requirements (ARARs). Alternatives 1, 2, and 3 leave contaminated groundwater in place allowing it to continue to move away from the site. If RCRA wastes have contaminated the groundwater at the Pagel's Pit site, then RCRA ARARs may apply to the remediation of the groundwater. This also means that any residue from the treatment of this groundwater would be a listed waste under RCRA and would have to be treated accordingly. The on-site treatment of the groundwater should be able to meet these ARARs, but these ARARs might make it impossible to send the groundwater to the local POTW for treatment (Alternative 4).

3. Long-term Effectiveness and Permanence

Alternative 8 could provide the highest degree of long-term effectiveness and permanence because the fixation process could greatly reduce the mobility of the contaminants in the wastes. However, this is a relatively new technology and testing would be required to determine its effectiveness at this site. The final landfill cover systems included with all alternatives except Alternatives 1 and 8 provide long-term effectiveness with proper maintenance. The covers reduce the mobility of the contaminants by covering the wastes and reducing water infiltration. Groundwater extraction and treatment provide long-term effectiveness by removing contaminants from the groundwater and preventing the spread of this contamination. Air stripping and carbon adsorption are processes that have been proven to be generally reliable. Management of the landfill gas and leachate provides long-term effectiveness by reducing the migration of contaminants to the groundwater. Since wastes will remain at the site in all of the alternatives, five-year reviews of the protectiveness of the remedy will be required.

4. Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternatives 4, 5, 5a, 6, 6a, 7, 7a, and 8 provide extraction and treatment of the groundwater. This will reduce the mobility and volume of the contaminants. Carbon adsorption may reduce the toxicity of the contaminants in the groundwater if these contaminants are destroyed during carbon regeneration. Alternative 7 reduces toxicity by oxidizing VOCs and SVOCs in the groundwater. Treatment of leachate at the POTW reduces toxicity by destroying some of the VOCs and SVOCs. Burning landfill gas reduces its toxicity. Extraction of leachate and gas from the landfill reduces mobility. The fixation of the wastes in Alternative 8 may greatly reduce mobility, but testing would have to be done to determine how much.

5. Short-term Effectiveness

The groundwater extraction in Alternatives 4 through 8 prevents the migration of contaminated groundwater and provides the greatest short-term effectiveness. There is the possibility of a slight impact on local residents from the air-stripper emissions in Alternatives 6 and 6a. This would be managed by means of emissions controls if necessary. Handling of the exhausted carbon in Alternatives 5 and 5a and the wastes from the pretreatment units in Alternatives 5, 5a, 6, 6a, 7, and 7a may present some slight risks to the workers and to others when wastes from these processes are hauled off site for proper disposal. The amount of wastes to be handled would be expected to be greater in the alternatives that are also treating leachate on-site. Installation of the groundwater and 45 extraction wells and modification of the leachate extraction system may present some risks to the workers. There are some possibilities of risks to residents and workers if the sanitary sewer being used to transport leachate and contaminated groundwater leaked. The extraction of gas and leachate from the wastes provides added protection against spreading of contamination. The cover for the wastes, included in all alternatives except Alternatives 1 and 8, provides protection against contact with wastes and contaminated soils. The implementation of the waste fixation system in Alternative 8 may pose some risks for the workers and the local residents since the wastes must be penetrated.

In each of the alternatives involving application of a final cover system and in the alternative involving the fixation process, the landfill would continue to operate until it is full. This should not expose the workers or local residents to excess risks. The present operation of the landfill includes leachate and gas extraction. The areas of the landfill that are not currently being filled have an intermediate cover. The principal threat identified would be addressed within a short period of time if the groundwater extraction system was installed and operated as soon as possible after the selection of the remedy.

6. Implementability

Among the alternatives requiring active remedies, Alternatives 2 and 3 would be the simplest to implement. All of the alternatives should be fairly easy to implement except for the fixation process of Alternative 8. A possible future implementation problem might arise in the alternatives in which leachate is sent to the POTW. These problems may come about if changes in the content of the leachate occur or regulations regarding waste streams that can be sent to a POTW change. Alternatives 5, 5a, 6, 6a, 7 and 7a require that a NPDES (National Pollutant Discharge Elimination System) permit be obtained for discharge of the treated water to Killbuck Creek. The permit should be obtainable. Alternatives 6 and 6a require an IEPA air permit, which should pose no problem.

The photolysis/oxidation process and the fixation process are fairly new and would have to be tested before they could be implemented. The air stripping and the carbon adsorption processes are well established and should present few technical problems.

7. Cost

The costs of the various alternatives are presented in Table 2. Alternatives 4, 5, 6, 6a, and 7 all cost about the same. Alternative 1 has essentially no cost associated with it. Alternative 8 is more than an order of magnitude more expensive than the other alternatives.

8. State Acceptance

The State of Illinois supports the selection of the preferred alternative.

9. Community Acceptance

Following the public comment period, community acceptance of the preferred alternative will be evaluated and described in the Record of Decision (ROD) that will be issued for this remedy.

SUMMARY OF THE PREFERRED ALTERNATIVE

In summary, both Alternatives 5 and 6 will substantially reduce risks to public health and the environment. Extraction and treatment of the groundwater will prevent the migration of contaminated groundwater and reduce the contamination in the extracted groundwater to levels where it can be safely discharged to the environment. The final landfill cover, and the assurances that it will be properly maintained, would provide for the safe management of the wastes which would remain at the site. Ongoing extraction of gas and leachate until these substances no longer pose a problem should significantly reduce the levels of groundwater contamination. Either of these preferred alternatives provides a good balance with respect to the evaluation criteria. Based on available information, U.S. EPA and IEPA have determined that either of the preferred alternatives would protect human health and the environment, would comply with ARARs, would be cost effective, and would use permanent solutions and alternative treatment technologies to the maximum extent practicable. Because the groundwater would be treated, through either carbon adsorption or air stripping following pretreatment; because the leachate would be treated, through transfer to the POTW where the leachate would be treated with the rest of the wastewaters; and because landfill gas would be treated, through burning, these alternatives would meet the statutory preference for a remedy that involves treatment as its principal element at a municipal landfill which poses only a relatively low, long-term threat to human health and the environment.

ROLE OF THE COMMUNITY IN THE PROCESS

U.S. EPA and IEPA encourage the public to comment on all of the remedial alternatives discussed in this Proposed Plan. These comments will be evaluated before the final remedy is selected for the site. For a complete description of the investigation and the alternatives under consideration for the site, interested parties can review the administrative record and other documents available in the following information repository:

Rockford Public Library
215 North Wyman Street
Rockford, Illinois 61101
(815) 965-6731

Written comments will be accepted during a public comment period from April 16, 1991 to May 16, 1991. Members of the community are encouraged to attend a public meeting on Thursday, April 25, 1991, 7 p.m., at the Howard Johnson Convention Center, 3909 11th Street, Rockford, Illinois, to discuss the proposed alternatives for remediating contamination at the site. Verbal comments will be recorded during the meeting.

Comments received during the comment period and at the public meeting will be addressed in a Responsiveness Summary which will be included in the ROD and will be made public in the information repository after the ROD has been signed. To send written comments or obtain further information, both before and after the public meeting, contact:

Cheryl Allen or MaryAnn LaFaire
Community Relations Coordinators
U.S. EPA Region 5
Office of Public Affairs (5PA-14)
230 South Dearborn Street
Chicago, Illinois 60604
(312) 353-6196 or
(312) 886-1728

Bernard J. Schorle
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230 South Dearborn Street
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Toll Free Number: 1-800-572-2515 (9:00 am to 4:30 pm Central Time)